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Extract from Note Book regarding the Genus Paussus. By Capt. W. J. E. BOYES, 6th Light Cavalry, Assistant to the Commissioner Kemaon and Gurwhal, with four Plates.

[We have, from press of matter and other causes, been hitherto unable to do justice to Capt. Boyes' valuable and interesting communication: not the last we hope from his pen on a subject so little known, and of such boundless extent as Indian Entomology; and those who know the difficulties attending the creditable execution of delicate plates by native artists, will we trust, as well as the author, make due allowances for our anxiety that his beautiful labours should not be marred in our hands.—Eds.]

Having observed that the genus *Paussus* among the Coleopterous Insects, has been placed with the *Tetrameræ* in every work on Entomology it has hitherto been my fortune to peruse, I am induced to forward to you the accompanying extracts from a note book which I have kept some time past, in hopes that the observations therein cited, may induce others more competent than myself to observe, and perhaps assign what I conceive might be a fitter place to the above-mentioned Genus.

Stark in his *Natural History*, correctly states, as far as I can vouch from my own experience, that the number of joints in the tarsus of the *Paussus* is five; which circumstance alone, should, I imagine, have proved a sufficient reason, for the removal of this Genus from the *Tetramerous* to the *Pentamerous* section of *Coleoptera*; but as it will be observed from the following notes, that in addition to its general form, which in outward appearance approximates to many of the *Carabici*, that it is also, similarly with several of the latter genus,

endowed with the faculty of crepitation, attended with the same results observable in many of these, their removal may (I think) well be warranted from the place they now hold to somewhere in the vicinity of *Aptinus* or *Brachinus*.

Regarding their form, it may be noticed, that the head is generally narrower than the thorax, or at most of the same width, eyes prominent, mostly reniform, sometimes ovaliform or gibbous; the body when viewed from above appears oblong, with the elytra either of one breadth throughout, or narrowed anteriorly, depressed and truncated posteriorly in most species; those which have the elytra of a uniform breadth, curved or sub-cylindrical above, present a rounded emargination to the wing cases at their latter extremities. The palpi though small, are salient, the labial ones being subulate; those of the maxillaries appear composed of four joints, of which the first is thicker than the rest; they differ from the labials in being arched from about midway, turning inwards until their apices are so approximated, that they appear to meet.

The abdomen is oblong, oval and tumid at the posterior extremity, sometimes of one breadth throughout, but more generally narrowed anteriorly. The femur in each fore-leg presents in many species a longitudinal and rather deep sulcus, which when the leg is contracted admits the tibia. The tarsus is composed of five joints, of which the first, though very minute and nearly concealed beneath the spine of the tibia, is still very distinguishable with a magnifier, particularly when the insect is in motion. The thorax resembles the form which obtains in that part of most of the *Carabici*, being generally cordiform, truncated posteriorly, with margins produced, though some species have it angulated in front and irregular.

In flight, the *Paussi* are exceedingly easy and agile, the lower wing when expanded being in comparison to the size of the insect of large dimensions, and when they alight, the movement is so sudden, and the elytra are closed so instantaneously over the lower wings, that they appear as having dropped down to the spot on which they rest, and where they generally remain several seconds previous to again attempting to move; facts which I have also remarked as practised by many *Carabici*. Its walk, however, entirely differs from that of this last mentioned genus, for instead of being nimble and occasionally

rapid, I have never seen it moving but in a slow and sedate manner, at which time the antennæ are extended to the front of the head, and to these is occasionally given an upward vibratory motion. What should bring these insects in nearer conjunction with the genus *Carabus* is the curious fact, that on being seized they emit from the anus a very acrid liquid, accompanied by an explosion, and attended with a strong scent resembling that produced by *Brachini*, and other allied genera when similarly treated; and although in minuter quantities, it is abundantly sufficient to produce a very sensible heat, and the crepitation may be distinctly heard and felt. Wherever the skin has been subjected to its action, discoloration immediately ensues of a reddish brown color, which soon after turns to a brownish black, resembling the stain produced by the touch of caustic, and which remains permanently fixed for many days after.

The explosion is occasionally repeated three or four times successively, at which periods a vapor may be observed to accompany each crepitation, attended with a strong, and very penetrating odour, something like that of nitric acid.

In one species I possess, the last segment of the abdomen is provided with two large bundles of hairs, resembling densely set brushes, which under the microscope are objects well worthy of examination; each hair appears like a fibre of golden-colored glass, and so closely are they arranged, that it is only on being disturbed that their true character can be discerned; yet notwithstanding the aid afforded by the movement, the hairs composing this curious appendage are only so far separable as to appear like a wetted painting brush. In another insect of the same genus, and probably differing only from the above-mentioned one in sex, the abdomen beneath, near the penultimate segment, is provided with two curved spines in addition to the hairy protuberance already noted. In a third, the posterior end of each elytra gives support to a moveable incurved spine, projecting over the last segment of the abdomen, and which when submitted to the microscope, appears strongly acuminate, and somewhat in the form of the extremity of a scorpion's sting.

In addition to these curious organs, several species are provided near the exterior margin of the elytra, at the posterior extremity, with a small papillaceous follicle, giving cover to an elongated appendage of

the same description, which is attached to the upper exterior margin of the abdomen, and which by the aid of a pin's point may be lifted up, and in a slight degree outspread, but collapsing immediately the impediment is removed. It would be difficult to assign reasons for the different addenda in the form of these insects, and observation alone can afford a clue to their uses, but that they are objects of extreme utility, and perhaps absolutely necessary in their economy as is easily to be conceived. Possibly the last mentioned appendages may be a source of further protection granted these curious insects, which are brought into play as danger may threaten; for in one I captured on the night of the 30th ultimo, and which flew into the lights on the table, I observed that when placed under the microscope, if these papillæ were touched, that they possessed the power of discharging a yellowish milky liquid, resembling pus in consistency, and which speedily overspread the lower part of the elytron, granulating into small egg-shaped grains. On repeating the irritation the same results occurred, and in order to be certain of the fact, I tried each elytron twice with the same effect. In my first trial the emission was so sudden and took me so much by surprise, that viewing the insect through the medium of the microscope, I fancied it sufficiently near to be injurious, and incontinently let it fall. I should mention, that in all these trials, each emission was accompanied with a faint acidulous odour. Although the appearance of each discharge obtained on the elytron, I am inclined to believe, that properly speaking, it issued from the foliaceous appendage on the abdomen, and that it spread over the wing case in consequence of the peculiar shape of the shards at the part which overlaps the extremity of the above-mentioned organ, but my experiments were unfortunately closed, ere I could satisfy my doubts, as my servant in removing the microscope to another table contrived to lose my specimen; since which I have been unsuccessful in making a recapture. At one time previous to my loss, I was inclined to believe that a minute perforation existed in the exterior angle of each elytron, with margins sufficiently elastic to allow the liquid to pass through, closing immediately after the emission, but I could not bring myself to any certainty on this point.

After capture, the *Paussus* may be made to lose its powers of crepitation by too much irritation, at which time it will resort to a very

common *ruse* practised by many insects, and simulate death, contracting all its legs towards, but not close to, the abdomen, in which position it will remain so long as it continues to be disturbed. This circumstance, as far as I have hitherto noticed, is not a common practice among the Carabici, though very generally adopted by almost all the Heteromeræ.

I may here observe, that many of the latter section of Coleoptera possess the power of forcing out a very caustic liquid, which exudes from the pores of the abdomen, and at the joints between the femur and tibia of each leg, a practice commonly resorted to when they are being seized. This liquid stains the skin wherever it happens to touch, to a purplish black, remaining on the part for many days after; and so corrosive is its nature, that it is only when the epidermis peels off, that the stain is removed. If plunged in hot water, a strong emission takes place from the anus, and the water is discolored to a purple, or ink black, according to the number of insects used, or requiring to be killed. In a similar treatment of a *Paussus*, a crepitation may be heard, and the abdomen becomes greatly distended, probably by rarefaction of air contained in vessels which give their assistance in its explosive powers, and the part retains the inflated appearance until a small perforation has been made in it with a needle's point, or such like instrument, which allowing the escape of the confined air, enables the abdomen to contract to its natural size. The same fact is peculiarly remarkable in many species of *Brachinus*.

Regarding the habits of the *Paussus*, my experience can give little or no aid, for of the seven species which I possess, one was captured on a heap of manure while searching for *Slaptryini* at Mhow in Malwa; a second came accidentally into my net while sweeping in some high grass at Sultanpore, Benares; three species were taken at night, generally between the hours of nine and ten P. M., having been attracted by the light on the table; another was rescued from the clutches of a small black ant, which circumstance I notice merely, because a belief exists, that the *Paussi* inhabit ant-hills, and the last was found crawling up the wall of my bathing room, from which the only conclusion I can arrive at is, that they are most frequently on the wing at a late hour of the night, and as noted in my memoranda, generally after rain. I now proceed to give the extracts alluded to, just as they stand, together

with drawings, from which the accompanying sketches have been taken. The originals being colored, I have preferred doing the copies in outline, that a lithograph might be the more readily and correctly produced, should this article be considered worthy of publication. The original drawings have in all instances been taken from the living insect, and which I shall be happy to forward if required. In the two first, Nos. 1 and 2, the minutiae were not alluded to, and being at some distance from my collection, I regret I am at present unable to give any delineations of their forms; latterly, having taken greater interest in the genus, more has been done, and it now only remains with me to assure you, that in the facts and experiments cited, I have always leaned to the doubtful side, and I therefore trust, that the errors which have crept in, (either as regarding the characterizing of my specimens, or the conclusions I may have arrived at,) will receive the indulgence an unpractised hand may merit.

No. 1. Fig. 1.—Mhow, July 19, 1839.—Genus *Paussus*, length 7-20th of an inch, body brown, deeper in the middle of the elytra. Antennae of two joints, of which the last is large, cuspiform, and having dentated edges with a scallop between each tooth, apex rounded exteriorly, basal angle produced, acuminate and forming a tooth at the end of the superior margins. Lower portions carinated, front view resembling the bows of a boat, head light brown, rounded posteriorly, emarginated in front, sunk nearly to the thorax, and bearing a minute depression in the centre of its upper part in the form of a diminutive horse-shoe. Eyes round when viewed from above, reniform when seen in flank. Thorax sub-octagonal, with rounded margins anteriorly, angulated and scolloped at the corners posteriorly, bisected in its centre, the posterior portion bearing a strongly produced emargination, which crosses transversely in the form of a bracket. Tarsi simple, cylindrical, the last longest, the first very small, almost invisible, of five joints in each leg, all of which are furnished with hairs beneath. Elytra truncated posteriorly, of a uniform width throughout, slightly depressed, body oblong, flattened, palpi conical, not very salient, maxillary ones tumid at base and over-arching the labials. Taken on a heap of manure at Plassie near Mhow.

Note.—This is the first insect of the kind I have seen at this place, and differs very much from the one I captured at Nusseerabad, which,

I included in the collection given to Dr. J.'s lady, since taken to Edinburgh.

No. 2, Fig 2.—Mhow, July 27, 1839.—Genus *Paussus*, length 6-20th of an inch, body brown, rather deeper in color near the sutural margin of the elytra. Antennæ of two joints, the last having an elongated pedicle resembling an intermediate joint, the club is pear-shaped when viewed from above, irregular if seen in flank, edges compressed, forming a carina which is produced into a small tooth near the basal angle. Head has the front slightly emarginated in front and rounded, narrower than the thorax from which it is exerted, eye rather large for the insect, rounded when seen from above, reniform when viewed on the side. Thorax cordiform, broadly truncated posteriorly, having a transverse sinus crossing its centre. Elytra narrowed anteriorly, rounded on the posterior external margin, squared on the internal one, abdomen tumid and very like many of the *Carabici* I have been lately taking. Tarsi of five joints, the first of the posterior tarsus scarcely discernible, unless the foot is put in motion; last joint longest, all of them cylindrical or ob-conical, and furnished with a few hairs beneath.

Note.—This insect came into the lights on the table sometime after gunfire last night.

No. 3, Fig 3.—Sultanpore, Benares, June 21, 1840.—Genus *Paussus*, length 10-20th of an inch. Antennæ of two joints, the last of which is massive, spindle-shaped when seen from above, irregular when viewed at the side, upper margin produced, and forming a recurved tooth at its basal angle, at the side of each club. Near the base is a slight impression somewhat in the form of a cocked hat, three rather deep sulci cross the club near the centre, extending half way down each side. The head, thorax and antennæ, are a light reddish brown. The under-part of the body, together with the abdomen and legs, are of a dark brown, tarsi almost black. The elytra are black with a margin of sienna brown, or light chesnut, and are densely covered with silvery hairs, apparent when viewed through the microscope. Near the posterior external margin of each elytron, is a curious appendage I have not previously observed in these insects. The abdomen has its latter segments very broad, and appears distended. The thorax is cordiform, broadly truncated posteriorly, with the posterior external angles slightly produced and rounded, a deep sinus in the form of a bracket

appears to divide the thorax into two nearly equal portions. The head is almost triangular, with a rather deep excavation on the frontal margin; the posterior part of the head presents a strong emargination rising in an arch between the eyes, which last are large, prominent, rounded from above, reniform if seen at the side. Palpi elongated, conical, those of the maxillaries overarching the labial, approximated near their tips, and apparently of four joints, of which the first is by far the thickest, the last cuneiform. This *Paussus* with its congeners is surely misplaced, and erroneously classed with the *Tetrameræ*, for the joints in all the tarsi are visibly five, and may be readily distinguished with the naked eye.

Note.—It struck me that of the three I captured last night, one crepitated, or made an explosion similar to that produced by the *Brachini*, and most certainly while I now write my finger and thumb bear marks, as of caustic or something like it, though I assuredly have not used any thing of the kind for many months past. We have had very heavy rain for the last eight days; yesterday was the first fine day we have had since the rain set in, which may account for my great good fortune in capturing so many as three of these highly curious insects, all of which by the bye came in late, for it was near one A. M. before I got to bed.

Note Book.—*Sultanpore, Benares, June 22, 1840.*—Captured another *Paussus* similar to the three taken on the 21st instant, but it unfortunately fell into the oil of the lamp, and was killed before I could try its crepitating powers, which I more regret, as it is quite uncertain when I may again procure a specimen. I have already noticed that we have had very heavy rain for several days past, and insects both last night and on that of the 21st were more numerous than I ever remember to have seen before. A lamp I placed outside for the purpose of attracting them to its light, was after a minute or so, extinguished by the immense numbers which flitted about it, and to save the wanton destruction of life, I was compelled to cover the lamp with a wire shade at the expense of much light. As for myself, I could scarcely remain near the spot, though covered from head to foot with a black blanket; even with this precaution, my hair and clothes were so covered by the myriads which swarmed around the light, and caused me so much annoyance by getting under my dress, that I was forced to

make a virtue of necessity, and strip myself to a pair of light trowsers and white night cap, but for which I considered myself amply repaid in the capture of many new, and to me rare, specimens. Among the most common were several varieties of *Carabus*, four entirely new to me, *Hegeter*, *Tenebrio*, *Agieliæ*, and swarms of minute *Capridæ*. Of the rarer sorts I took two new *Cicindelæ*, two *Colymbetes* and very beautiful *Halipus*, which I had never before seen. All these came around the light in numbers, but *Staphylini* and the smaller *Orthopterous* insects were incredibly numerous. I was almost black with them, and the sensation produced over my back, arms and legs, from the multitude of grasshoppers and crickets which were constantly jumping on or off me, and crawling in every direction, was very similar to what is called "needles and pins," or a "foot asleep." Great indeed was the enjoyment of a bathe with some dozens of ghurrahs filled with cold water, which I poured over my head before retiring to rest at one A. M. I should also mention, that on visiting the Commandant of my Regiment this morning, I found that he also had captured a *Paussus* last night, similar to those I have been lately taking, between the hours of nine and ten P. M., and rather strangely to say, his specimen had shared the same fate as my last, having fallen into the oil-burner on the table.

No. 4, *Fig. 4.*—*Sultanpore, Benares, July 24, 1841.*—This *Paussus* has already been figured in the 2d vol. of the Transactions of the Entomological Society, by W. W. Saunders, Esq., but as his drawing though highly characteristic, must (I conclude) have been taken from a dead specimen, perhaps a dried one, I have thought it worth while, if only for my own satisfaction, to make another delineation of it from a living specimen which I this morning captured, having succeeded in rescuing it without damage from the gripe of a small black ant, which in spite of its struggles was bearing it along with the utmost facility, holding on by one of its antennæ. Length seven-twentieths of an inch. The head is rounded posteriorly and sunk into the thorax. A deep cavity with edges in the form of a horse-shoe, the anterior margins of which are levelled towards the front, is a prominent feature in this organ. The bevelments terminate at the front just above the forehead, at which spot they turn upwards a little, and appear to spread out in the form of a rather deeply emarginated clypeus. In the centre of this excavation are two

minute vesicles, resembling the eyes on the anterior extremity of the scorpion, of a resinous color and lustre. The antennæ are composed of two joints, the last very large, somewhat irregular, approaching in form to navicular. The edges of the upper margin present the appearance of a screw, both edges meet posteriorly, and form a slightly recurved spine projecting from the basal internal angle. The club when viewed at the side, resembles a butcher's cleaver. The thorax has its upper portion cardiform, and appears as if fitted into a cavity of the lower part, which latter also presents a crenulated edging extending the whole breadth of its centre. The margins of the thorax, head, and particularly the screw-formed edging of the antennæ, appear translucent, and in color very much resemble shell lac. The eye is kidney-shaped, but appears round when viewed from above. The palpi are short, and not very salient. The abdomen is turned and gibbous near the cloaca, and its extremity is furnished with two large bundles or brushes of densely set golden colored hairs, having also a vitreous appearance, and which are only rendered distinguishable by being disturbed with the point of a pin or such like implement; these hairs I found so very closely arranged, that even with my greatest care in trying to separate them, I never once succeeded in singling out a fibre: they always remained in bundles, or in the form of a moistened painting brush. I must not omit to state, that the character of this curious appendage was (I believe) first made known to the world by W. W. Saunders, Esq.; at all events my observations on it were induced from what I read in his account of this *Paussus*, published in the 2nd vol. of *Entomological Transactions*.

The elytra which are black, with their anterior and posterior margins of a pinkish brown, have their surface closely covered with silvery hairs, and near their posterior external margins the curious folicle I have already observed in No. 3, is very apparent. The abdomen is of a dirty yellow or Isabella color, approaching to light umber, and near the penultimate segment beneath, there are a pair of spines which curve slightly outwards, for what intent and purpose I cannot conjecture. Breadth of elytra and abdomen equal throughout. Tarsi evidently of five joints, the last longest.

Note.—I tried all I could to induce this specimen to crepitate, without success. Probably its battery had been expended in its struggles

with the ant, from which I captured it. On being touched, it would immediately simulate death, and remain with contracted legs for many minutes at the bottom of the tumbler in which it was placed. The second day becoming more and more lethargic, and fearing its death might ensue, I plunged it into hot-water, at which moment the abdomen became very much distended and glabrous; but this was the nearest sign I could perceive of any approximation to the Brachini.

No. 5, Fig 5.—*Sultanpore, Benares, August 17, 1841.*—I this day captured the *Paussus* delineated as No. 5, which I however consider to be of the same species as No. 4, but differing in sex. On being captured, it immediately emitted two loud and very distinct crepitations accompanied with a sensation of heat, and attended by a strong acidulous scent. It left a dark-colored stain on the fingers resembling that produced by caustic, and which had a strong odour, something like nitric acid. A circumstance so remarkable induced me to determine its truth, for which purpose I kept it alive till the next morning, and in order to certify myself of the fact, the following experiments were resorted to. Having prepared some test paper by coloring it with a few petals of a deep red oleander, I gently turned the *Paussus* over it, and immediately placed my finger on the insect, at which time I distinctly heard a crepitation, which was repeated in a few seconds on the pressure being renewed, and each discharge was accompanied by a vapor, like steam, which was emitted to the distance of half an inch, and attended by a very strong and penetrating odour of nitric acid, in every respect (as far as I could judge) similar to that produced by many species of *Brachini*, I have frequently had opportunities of trying. On removing the *Paussus* from the paper, I found that a large spot was formed, near the place where the abdomen had been, and extending backwards for one-third of an inch. The paper appeared strongly corroded as if with caustic, the color of the spot being light brown, and totally distinct from the purple of the surrounding surface. Having repeated this experiment four times during the day with the same results, and being perfectly satisfied that I could not be mistaken, I proceeded to kill and set the specimen. On being thrown into boiling water, the abdomen swelled up and appeared like an inflated bladder, being very much distended, assuming the same appearance as that which is observable in *Brachinus* and other

allied genera, when they are similarly treated, and which I have had hundreds of opportunities of verifying. From these facts I presume, that there is a greater connexion between *Paussus Carabus* than is generally believed, and perhaps they might be removed with advantage to the vicinity of each other. It was only when I commenced setting my specimen for the cabinet, that I observed that it differed slightly from my No. 4. I may therefore give the description.

The principal points in which it differs are : first, in the thorax, the cremelations which cross its centre being more deeply sculptured and foliated ; secondly, the antennæ instead of leaving their upper margins in the form of a screw, are dentated, having four rather large scallops on each side, one between each tooth ; and lastly, the abdomen, though provided at its posterior extremity with the brushes noticed in No. 4, wants the spines beneath the abdomen, which latter organ instead of being of one breadth throughout, is narrowed as it approaches the thorax. In length it is the same, being 7-20th of an inch long, including the antennæ when placed at an angle with the body, and of the latter organs the last joint is the largest, of an irregular form, or nearly boat-shaped, with dentated margins above, which terminate at the posterior and superior angle in a tooth. The excavation on the head is very deep, at the bottom of which, the two vesicles similar to those noticed in No. 4 are very apparent, and highly resinous in lustre. The palpi are somewhat more salient, but at the same time more attenuate than in that insect. In its markings, there is also a strong resemblance, but the abdomen is slightly darker, and the pinkish brown patches at the posterior and anterior margins of the elytra are broader and better defined. I should notice, that in each experiment on the detonating power of this insect, I have used a different finger in giving the small degree of pressure required to induce its crepitating ; all of which have been well marked, but those of the last two trials are not quite so dark as the stain left on the three first, and I am anxious to see how long they will remain on my hands. Although I have for some time past suspected the fact, that the *Paussus* had the curious property observable in some of the *Carabici*, and which (I imagine) is believed to be inclusively attached to them, it was not till the capture of the present specimen that I determined to try the truth of my surmises. The present insect having been taken by a lady in com-

pany, who from the sensation she felt beneath the finger, concluded she had mistaken a small *Brachinus* for a *Paussus*, and the skin of which, bore evident marks of the dispoision, I have been induced to make these experiments, and the results have been as above stated. Captured No. 5 at a quarter after nine P. M.

Note.—*August 29, 1841.*—All the marks off my right hand.

Note.—*September 3, 1841.*—I have now lost all the stains on the fingers of my left hand, which I received in the experiments performed on *Paussus*, No. 5, by which it appears, that those of the left hand have remained 18 days, or 6 days longer than those on the right. This is singular enough, and I can only attribute the loss of the marks so much earlier in the right hand fingers to attrition, and more constant use, as the stains left were certainly much deeper in the three first trials than in the latter ones, and where I used the first, second, and third fingers of my right hand respectively.

No. 6, Fig. 6.—*Sultanpore, Benares, September 5, 1841.*—This *Paussus* has the thorax somewhat similar to that part of No 1 which I captured at Mhow, but in other respects differs considerably. Length 6-20th of an inch. The antumæ are composed of two joints, of which the last is very large, and in the form of a wide-mouthed cornucopia, being attached to the first at its basal angle. The margins of the upper side are slightly crenulated, and the upper surface is rather deeply excavated, giving this part a cuspidiform appearance. Anterior and posterior margins compressed, the latter produced into a blunt recurved tooth. The sides of the club are faintly striped with 6 grooved bands; the eye when seen from above appears round, of an irregular oval shape when viewed from the side. Head trigonal, depressed with a marginal excavation, but no groove on the upper part. The thorax appears as if composed of two portions, the anterior being angulated, and forming a rather sharp spine on each side, with its base inserted in the posterior part. This latter portion is crenulated, with the exterior margins produced and rounded; a sulcus in the form of a bracket crosses the centre. The elytra are black, broadly patched anteriorly with brownish sienna, the posterior margin has a faint undefined line of the same color, which blends into the general black of the wing cases. The follicles at the exterior margin of the elytra posteriorly are much produced, and close to them on each side is a very

curious moveable spine, slightly incurved, and projecting over the latter segment of the abdomen. Body beneath a bright chestnut; head, antennæ and thorax a livid brown; all the joints in the tarsi are simple, cylindrical, furnished with hairs beneath, and of five joints in each leg, the first small, the last longest.

Note.—Taken accidentally while sweeping in high grass with a net under a Munja clump, (*Saccharinum Munja*.) On withdrawing this insect from the net, it gave two very distinct explosions, leaving the ordinary black stain on my fingers, the abdomen also swelled very much when submitted to the hot-water process.

No. 7.—*Sultanpore, Benares, September 6, 1841.*—A very curious *Paussus*, length 6-20th of an inch. Antennæ of two joints, the last long, club-shaped and grooved all round, forming six divisions, which, however, I could not discover to be perfoliate. The first joint near the base beneath is furnished with a small curved spine, above which, near the club, is a minute oval excavation. Head hexagonal, irregular, somewhat gibbose; eyes not visible from above, rounded when seen at the side. Thorax cordiform, broadly truncated posteriorly, with two small depressions on each side. Abdomen cylindrical, or shaped like a tub, palpi small, salient, the labial ones being over-arched by those of the maxillaries. No follicle observable on elytra. Tarsi of five joints, all simple, the first exceedingly minute. The coloring in this insect is peculiar; the last three divisions of the antennæ, and lower half of the elytra, are blue black. The head, antennæ, thorax, abdomen, and upper portion of the elytra, a bright light sienna. The legs and tarsi chestnut.

Note.—Found crawling up the wall of my bathing room. On being plunged into hot-water, the abdomen became greatly distended; but I observed no crepitation at this moment, or at the time of capture.

No. 8, Fig. 8.—*Almorah, July 29, 1842.*—Genus *Paussus*, length 9-20th of an inch. Head gibbous, strongly excavated both anteriorly and posteriorly, exserted from the thorax, the neck appearing very long. Antennæ of two joints, the last long, shaped like a peas-cod and bearing a small recurved tooth near 'the base of the upper' margin, edges compressed, and forming a carina on each side. Thorax cordiform, broadly truncated posteriorly, with the lateral margins produced: a sulcus in the form of a crescent runs across the thorax near its

centre. Elytra slightly narrowed anteriorly, and when viewed through the microscope appearing smooth, with diminutive frettings running in irregular lines down each; these are blue black, with a line of brown extending along the sutural margin, and a shading of the same color obtains both anteriorly and posteriorly. Head, thorax, and body chestnut brown; tarsi of five joints, the first small. Palpi rather large, salient, those of the maxillaries in particular. Eyes almost oval, but still uniform. Follicle on the elytra very apparent.

Note.—On capturing this insect which came in towards the light on the table some time after gun-fire, last night, I distinctly heard two strong crepitations, and my fingers were deeply stained with a brownish black color, and I accordingly reserved it for further trials, but unfortunately it appeared so weak this morning, that I was after ineffectual attempts to induce crepitation, obliged to postpone my experiments to a future date. On being killed with hot-water, the abdomen however shewed the usual sign, becoming greatly inflated.

Almorah, July 30, 1842.—I have indeed been fortunate in capturing the same species of *Paussus* as that of the 29th instant, and which was taken under precisely similar circumstances, having come to the lights at about 10 P. M. The crepitation on its capture was loud and very distinct, so much so, as to be heard by the company at table, and certainly equal to that of most of the small *Brachini*. I therefore tested its powers this morning again, having prepared some post paper with the petals of a deep colored *Dalilia*. I went through the old trial. The insect being carefully turned over it, I attempted its seizure, and as expected, a loud explosion was given, accompanied with vapor, and a strong scent of nitric acid. (I have the pleasure to transmit the paper on which the experiments were tried which bears two distinct marks, having only tested this insect twice.)*

I now proceeded to examine the foliaceous appendage on the elytra through the microscope, and I found that when the part was touched, an emission immediately took place from the spot, which spread so instantaneously over that part, that I could not observe exactly whence it originated. The appearance of the liquid resembled pus, which in a second or two granulated (if I may so term it) into egg-shaped grains, of which no traces remained after a lapse of a minute.

* We have not received this.—EDS.

I tried each elytron twice with precisely the same results ; during each emission a faint acidulous odour prevailed, and the part being touched with my finger, imparted that scent in rather a stronger degree to it. Having taken a drawing of the insect, I directed my servant to remove the microscope to another table, and in so doing, he unfortunately dropped the specimen, and has thus brought my experiment to a close.

Should the foregoing observations be considered worthy of publication, I shall be happy to transmit further extracts from my Note Book as occasion may present, or apply myself to any other point of utility in which my services may be deemed acceptable.

I also take this opportunity of enclosing the copy of a very magnificent species of *Scarabeus*, which I was so fortunate as to capture a few days since. The form appears familiar to me, and I fear may not be new to science ; but having no means of referring to books on the subject myself, perhaps you can supply the required information ; at all events, as it strikes me to resemble the general form assumed by the equatorial *Scarabæi*, it will be interesting to know that this insect was captured at an elevation of near 9,000 feet above the level of the sea, having been taken on the summit of the Gogur range in Kumaon, and was found feeding on the leaves of a tree unknown to me, but which I believe to be a species of Maple. Length three inches, weight one ounce, head and thorax a jet glossy black, the former furnished with a large recurved horn in the form of a sickle, compressed at the base. The thorax presents four protuberances, two above and two on the anterior margins. Scutellum black, elytra light chesnut brown, abdomen and legs deep chocolate. The maxillaries curiously dentated at their apices, and furnished with hairs. Maxillary palpi of four joints, the last spindle-shaped and longest, the first conical and smaller than the second. Mandibles, which are corneous and squared, jut out considerably beyond the sides of the head ; they are also thickly set with hairs, both on the internal and external sides, labial palpi very small. Antennæ of ten joints, the first conical, the next three nearly round ; the club is composed of three leaflet joints, and the intervening ones are nearly cuspidiform, the tarsi are simple, of five joints, the last much produced. Hooks nearly equal in length, and furnished beneath with a stiff seta, which near its apex is split into a brush-like form. Taken August 17, 1842, above Budlakhote, Kumaon. The drawing is taken of the natural size.

Fig: 1

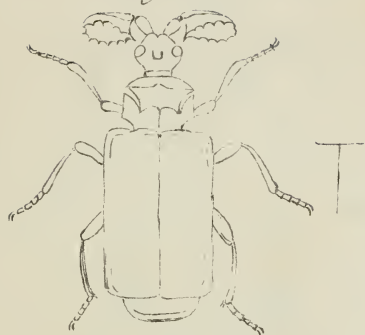


Fig: 2



Fig: 3

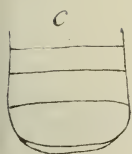


Fig. 4

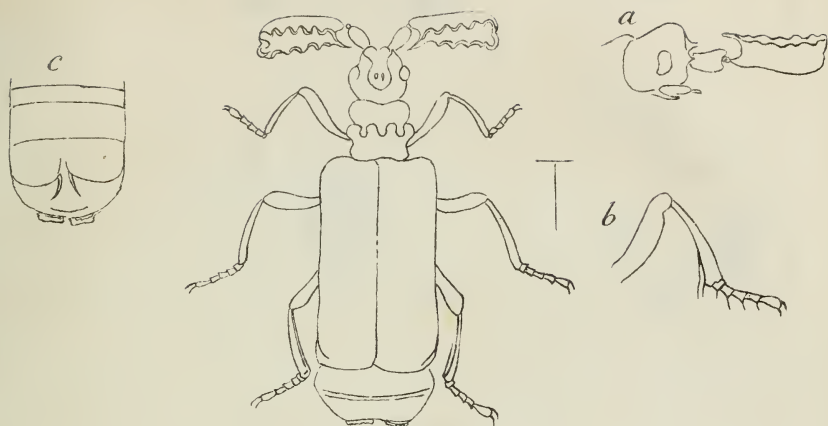


Fig. 5

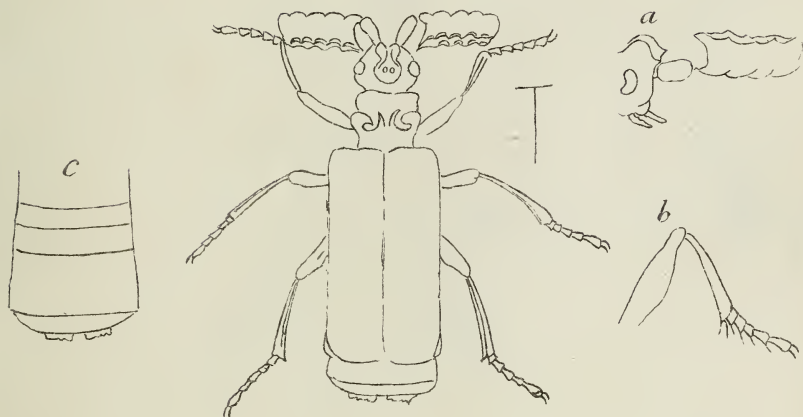


Fig. 6

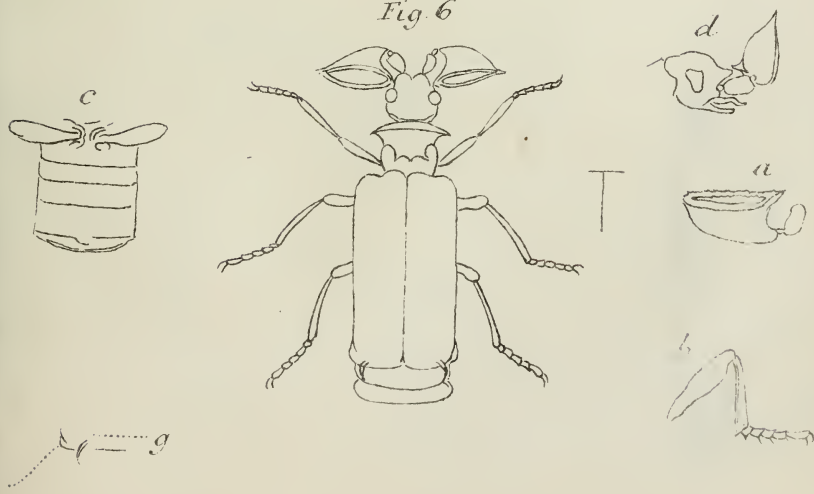


Fig 7

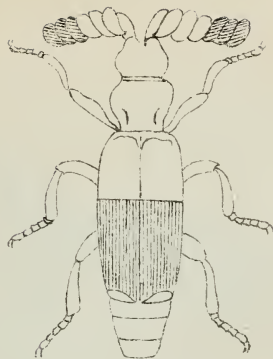
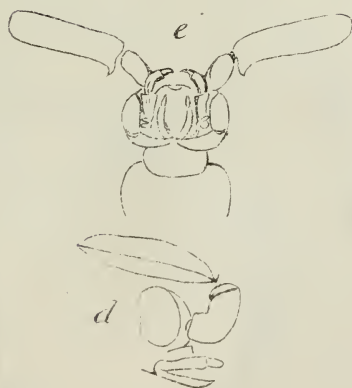
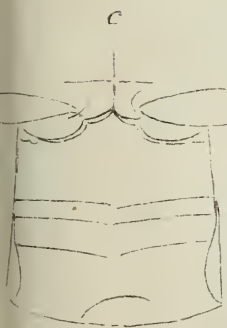
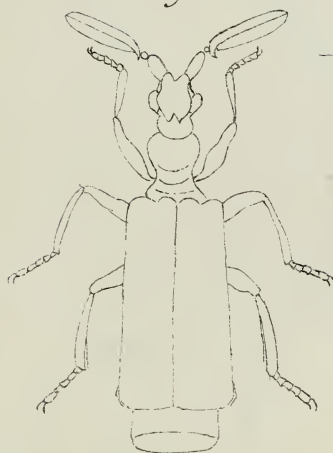
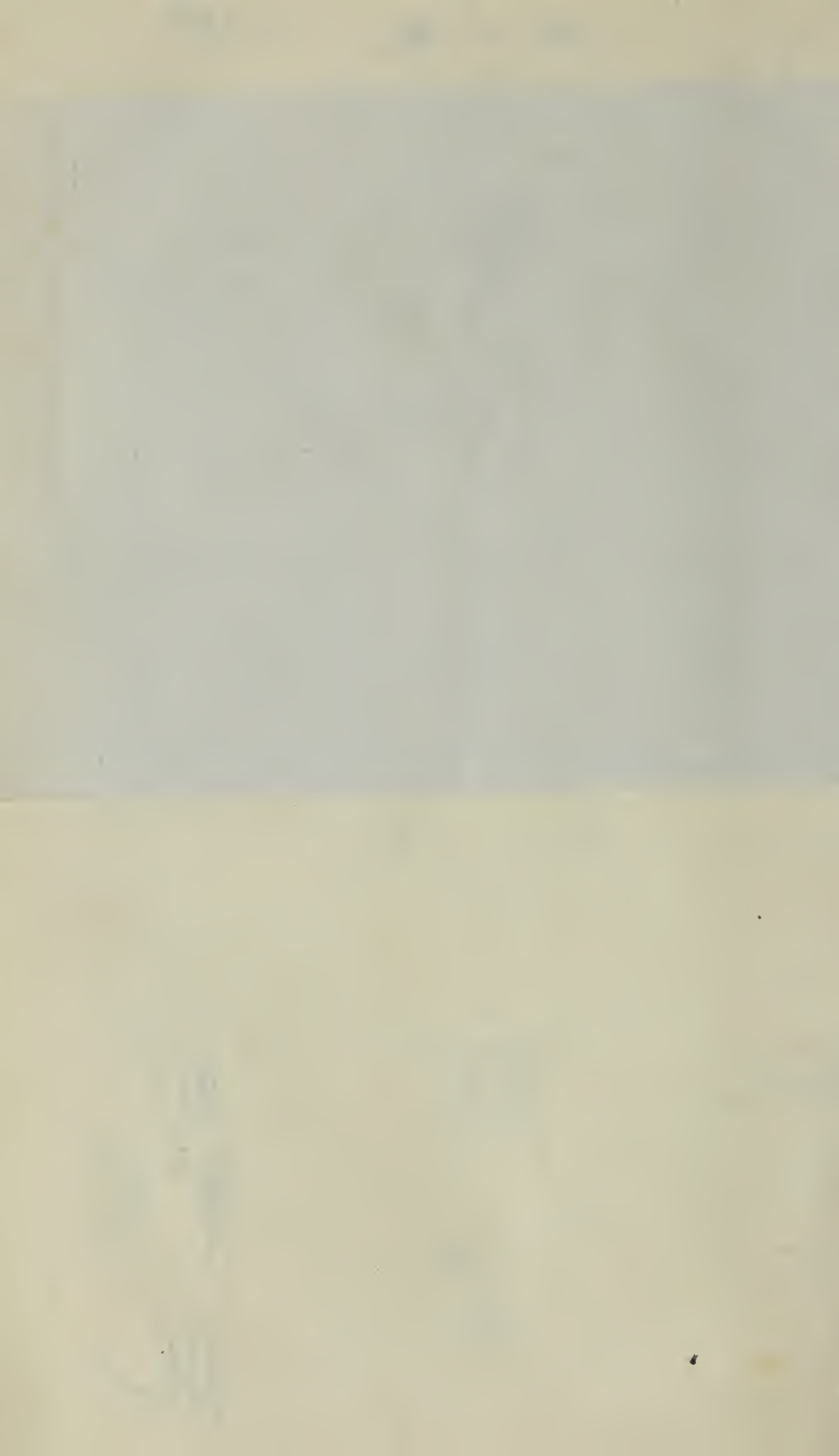
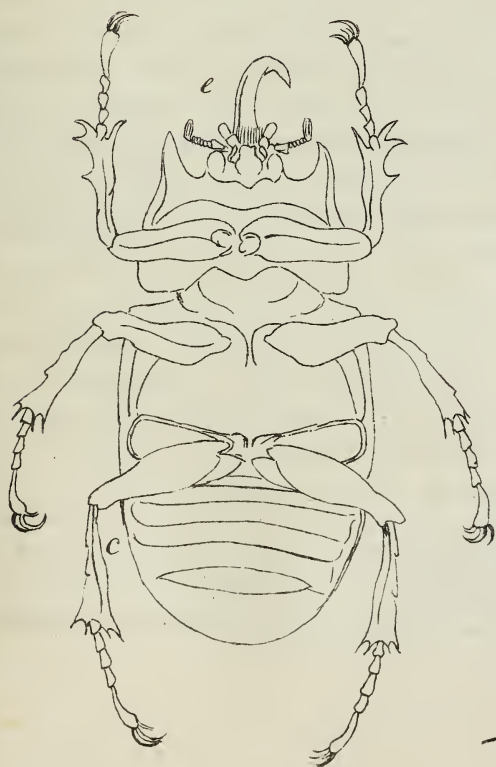


Fig 8







The accompanying letters refer to the sketches of the Paussi equally with the Scarabeus: *a*, antennæ; *b*, posterior tarsus; *c*, abdomen; *d*, side view of head; *e*, inferior view of head; *f*, underwing; *g*, spine of elytra; *h*, folicle or elytra; *i*, maxillary palpus and maxillar.

Almorah, September 16, 1842.

Memorandum on the construction of a Portable Meridian. By E. C. RAVENSHAW, Esq., B. C. S.

1st. Those who have visited the Cathedral of Florence, or the Church of Saint Petronio at Bologna, may recollect having observed a straight line running down the whole length of the aisle, and a small round hole in the wall of the building, about fifty or sixty feet above the level of the pavement. A traveller who should enter either of the said churches about noon, would not fail to be struck by the mysterious conduct of those about him; a dozen watches of quaint forms and various sizes would be seen to spring suddenly from the fobs and waistcoat pockets of people as quaint and peculiar as their timepieces. Their eyes would be seen to be intently fixed on some object on the ground, and the traveller would naturally imagine that the toe-nail of a saint or a martyr was about to perform a miracle, the exact period of which it was as important to fix as that of the transit of Venus. On joining this interesting group, the traveller would find that the object of solicitude was a bright round spot caused by a ray of the sun passing through the aperture above mentioned, which is seen slowly approaching the line that runs down the centre of the aisle. This line is a meridian, and when the bright round spot arrives at, and is bisected by this line, the sun intimates to the spectators, that he has reached his meridian altitude. The watches are returned to their fobs, and voices are heard muttering in Italian, German, French, and English, either self-congratulations on the accuracy of their Breguets, or complimentary remarks upon the artists who manufactured their watches.

2d. Imitations of these magnificent meridians are made on a small scale by individuals for private use; a wooden rod or pedestal, about a foot high, having an iron plate with a hole in the centre, fixed at right angles on the top of the pedestal, forms the substitute for the wall of the Cathedral; one of this description is (or was two years ago) to